IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Brian Medower
Application No. 10/056,927
Filing Date: 01/24/2002
For: Use of Mother Stamper for Optical Disk
Examiner: Melvin C. Mayes
Art Unit: 1791
Attorney Docket No.: M-11628 US

APPELLANTS' OPENING BRIEF

Real Party In Interest

The real party in interest is DPHI Acquisitions, Inc., the present assignee of US Application No. 10/056,927.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1 – 11, 13, 15 – 23, 25, and 26 are pending and are more than twice-rejected by the non-final Office Action dated February 11, 2008.

Claims 12, 14, 24, and 27 – 31 are cancelled.

The rejection of claims 1 – 11, 13, 15 – 23, 25, and 26 is appealed.

Status of Amendments

An amendment was filed and entered with the response to final office action mailed December 10, 2007. An amendment under 37 CFR 41.33 is concurrently filed with this appeal to cancel claims 19-23, 25, and 26.

Summary of Claimed Subject Matter

The claimed subject matter relates to optical disk drives. An optical disk can be either a read-only or a writeable disk. A familiar example of read-only optical disks are conventional DVDs. To produce a DVD, a plastic substrate is stamped with the read-only features and then covered with a reflective coating such as aluminum to form an information layer. The aluminum information layer is then covered with an additional plastic layer (to defocus dust and fingerprints) to complete the DVD. In contrast, a writeable optical disk includes an information layer that must absorb light in some fashion to allow recording of data. It may thus be seen that writeable and read-only optical disk formats have competing needs: the read-only (ROM) disks have an information layer that reflects light whereas a writeable (RAM) disk has an information layer that must absorb light.

Because of the competing needs for ROM and RAM optical disk formats, prior art examples of disks that had both a ROM portion and a RAM portion were awkward affairs and expensive to manufacture. One portion (either the ROM or RAM) would have its information layer deposited and would then need to be masked off before the remaining portion could be completed. But the Applicants solved such complication and expense by providing an optical disk where a manufacturer could first stamp a substrate with both the features for ROM and RAM portions. This stamped substrate could then be covered with a single phase-change material to form the information layer. Finally, the information layer could then be covered with a dielectric layer to enhance optical contrast to complete the disk. The striking advantages of such a disk may be immediately appreciated: there need be no masking of either the ROM or RAM portions but instead both portions are formed in one act using the phase-change layer.

The Applicants denoted their ROM/RAM disk as a "first surface" disk to distinguish it from conventional optical disks such as the DVD discussed above. In such conventional disks, the information layer is covered with a relatively thick (generally at least 0.5 millimeter) polycarbonate layer that acts to defocus defects such as fingerprints and dust. Because this polycarbonate layer is relatively thick from an optical standpoint, the information layer is a separate surface

(second surface) from the defects on the disk surface. In contrast, the Applicants' optical disk has an information layer that is not covered with a defocusing layer. Although defects such as fingerprints or dust are then optically within the same layer as the information layer, the advantage of such first-surface disks is a greatly enhanced data capacity because the optical bits can be made smaller due to the lack of aberration introduced by the missing polycarbonate covering layer.

Applicants discovered that although the resulting ROM/RAM optical disk could be formed in this advantageous fashion, it was difficult for an optical disk drive to distinguish the grooves within the RAM portion. Thus, they invented a mother stamper process to produce their ROM/RAM disks so that the grooves within the RAM portion were more distinguishable. The claims reflect such an innovation. Because claim 19 is now cancelled, there is only one remaining independent claim: claim 1.

Claim 1 is directed to a method for making a first-surface disk including the act of "providing a father stamper, wherein the father stamper comprises spiral protrusions on a first portion of a first surface and bumps on a second portion of the first surface, the spiral protrusions and bumps corresponding to original laser cuts." Support for this act is given on page 11, lines 12 through 29, wherein the Applicants describe the laser exposure of a photoresist layer on a master disk to form bumps (corresponding to the ROM portion of the ensuing disk) and a spiral of protrusions (corresponding to the RAM portion of the ensuing disk). Applicants describe the remaining formation of the father stamper on page 13, lines 6 – 22 (which involves the coating of the laser-etched master disk with nickel and removing the nickel plating to complete the father stamper).

The father stamper is then used to form the mother stamper. Claim 1 recites the formation of the mother stamper through the acts of "coating the first surface of the father stamper with nickel" and "separating the nickel from the first surface to produce a second stamper having groove recesses and pits on a first surface, wherein the groove recesses are mirror images of the spiral protrusions and the pits are mirror images of the bumps." Support for these acts is given on

page 13, line 23 through page 14, line 11.

The mother stamper may then stamp a substrate with the ROM (bumps) and RAM (lands) features. Claim 1 recites the stamping step through the act of "covering the first surface of the second stamper with a plastic material" and "separating the plastic material from the second stamper, wherein the plastic material has lands corresponding to the groove recesses of the second stamper and bumps corresponding to the pits." Support for this act is given on page 14, line 12 through page 15, line 18.

As discussed above, prior art disks required masking steps because the ROM and RAM portions were formed using different materials. However, the Applicants have advantageously alleviated such complexity by producing both the ROM and RAM portions using a single phase-change material. Claim 1 reflects such an act by reciting "depositing a phase-change material directly over the lands and bumps, wherein the phase-change material is in a first state upon deposition and in a second state after being written to, and wherein the change from the first state to the second state changes the optical phase of the phase-change material in the positive material, the lands forming a writeable area of the first-surface disk and the bumps forming a read-only area of the first-surface disk." Support for this act is given on page 15, line 19 through page 16, line 25.

Although the resulting first-surface disk could be used without additional modification, a dielectric layer deposited on the phase-change layer enhances the optical phase difference between the first and second states of the phase-change material. Accordingly, claim 1 recites the act of "depositing a dielectric layer over the phase-change material to form the first-surface optical disk, the dielectric layer being deposited to have a thickness that enhances an optical phase difference between the first and second states of the phase-change material, the first-surface optical disk consisting of no further layers." Support for this act is given on page 16, line 26 through page 17, line 10.

Grounds of Rejection to Be Reviewed on Appeal

1) Whether, under 35 U.S.C. § 103(a), claims 1-4, 6-11, 13, 15-18 are unpatentable over Edwards (2001/0016301) in view of Pan (USP 4,960,680) and further in view of Berg (2001/0036148) and JP3-86943.

2) Whether, under 35 U.S.C. § 103(a), claim 5 is unpatentable over over Edwards (2001/0016301) in view of Pan (USP 4,960,680) and further in view of Berg (2001/0036148), JP3-86943, and Dobbin (RE 34,506).

Argument

1). The rejection of claims 1-4, 6-11, 13, and 15-18 as being unpatentable over Edwards (2001/0016301) in view of Pan (USP 4,960,680) and further in view of Berg (2001/0036148) and JP3-86943

Despite the rather protracted prosecution history of this application, no prima facia showing has been made that it is obvious to produce an optical disk having separate ROM and RAM portions by depositing a phase-change material over stamped substrate, let alone a showing that such a ROM/RAM disk could be made using a mother stamper process. As discussed above, a conventional ROM disk such as the DVDs one can rent at Blockbuster and other retailers is formed by coating a stamped substrate with a reflective metallic layer such as aluminum. In contrast, writeable disks require an information layer that absorbs rather than reflects light. Thus, it is conventional during the production of a disk having a ROM portion and a RAM portion to form the RAM portion separately from the RAM using masking steps because the information layer (such as a phase-change material) used in the RAM portion was different from the information layer (such as an aluminum layer) using in the ROM portion.

In sharp contrast, claim 1 is directed to a disk manufacture method

wherein the ROM and RAM features are stamped into the substrate and the resulting stamped substrate covered with a phase-change material to form both the ROM and RAM portions in that claim 1 recites the act of "depositing a phase-change material directly over the lands and bumps, wherein the phase-change material is in a first state upon deposition and in a second state after being written to, and wherein the change from the first state to the second state changes the optical phase of the phase-change material in the positive material, the lands forming a writeable area of the first-surface disk and the bumps forming a read-only area of the first-surface disk."

The primary Edwards reference is directed to the formation of a master disk (the template that is used to stamp substrates to form optical disks) using a mother stamper process. To provide a teaching to form the inventive ROM/RAM disk manufacture method of claim 1, the February 11, 2008 office action points to a paragraph 52 of Edwards, wherein Edwards described his disk master as possibly including many features such as pits, bumps, grooves, etc. But such generic features are well known in the disk arts – Applicants readily admit that they did not invent the fact that ROM disk portions are formed using bumps or pits whereas RAM disk portions are formed using spiral lands and grooves. That is the way such disks have been formed. But what was not known was that you could form a ROM/RAM disk by just stamping the ROM and RAM portions into a substrate and then covering the stamped substrate with a phase-change material. Paragraph 52 of Edwards does nothing to provide such a teaching.

The remaining prior art does nothing to cure the infirmities of Edwards. For example, the Pan reference merely provides a teaching for a phase-change material. The relevance of the Berg reference is even murkier: the February 11, 2008 office action points to paragraphs [0010] and [0011], which are both directed to objects of Berg's invention. In that regard, paragraph [0010] is directed to the object of providing a foldable drive, which is entirely immaterial to what is claimed in claim 1. Paragraph [0011] is directed to the object of providing a servo writer to write servo data to the disk: again such a teaching is entirely immaterial to what is being claimed in claim 1. Finally, the Japanese reference

does nothing to provide a teaching for the formation of a ROM and RAM portions by covering a stamped disk with a phase-change material. Accordingly, claims 1-4, 6-11, 13, and 15-18 are patentable over the combination of the Edwards, Pan, Berg, and Japanese references.

2) The rejection of claim 5.

The Dobbins reference does nothing to cure the infirmities of the Edwards, Pan, Berg, and Japanese reference discussed above.

Therefore, in light of the foregoing arguments, Applicants respectfully request the Honorable Board of Appeals to reverse the decision of the Examiner with respect to claims 1-4, 6-11, 13, and 15-18.

Respectfully submitted,

Date: August 12, 2008

By: _____

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Claims Appendix

1. A method of making a first-surface optical disk, comprising:

providing a father stamper, wherein the father stamper comprises spiral protrusions on a first portion of a first surface and bumps on a second portion of the first surface, the spiral protrusions and bumps corresponding to original laser cuts;

coating the first surface of the father stamper with nickel;

separating the nickel from the first surface to produce a second stamper having groove recesses and pits on a first surface, wherein the groove recesses are mirror images of the spiral protrusions and the pits are mirror images of the bumps;

covering the first surface of the second stamper with a plastic material;

separating the plastic material from the second stamper, wherein the plastic material has lands corresponding to the groove recesses of the second stamper and bumps corresponding to the pits;

depositing a phase-change material directly over the lands and bumps, wherein the phase-change material is in a first state upon deposition and in a second state after being written to, and wherein the change from the first state to the second state changes the optical phase of the phase-change material in the positive direction, the lands forming a writeable area of the first-surface disk and the bumps forming a read-only area of the first-surface disk ; and

depositing a dielectric layer over the phase-change material to form the first-surface optical disk, the dielectric layer being deposited to have a thickness that enhances an optical phase difference between the first and second states of

the phase-change material, the first-surface optical disk consisting of no further layers.

2. The method of claim 1, wherein the covering comprises injecting the plastic material using an injection molding process.

3. The method of claim 1, wherein the phase-change material is an SbInSn alloy.

4. The method of claim 1, wherein the providing comprises: providing a glass master disk with a first and a second principle surface; depositing a photoresist layer on the first principle surface of the disk; removing selected portions of the photoresist layer; depositing nickel over the photoresist layer; and separating the nickel from the photoresist layer to form the father stamper.

5. The method of claim 4, wherein the removing is by laser ablation.

6. The method of claim 4, wherein the removing comprises: exposing the selected portions of the photoresist layer; and etching the selected portions.

7. The method of claim 6, wherein the exposing is performed with a laser and results in the original laser cuts in the photoresist layer.

8. The method of claim 1, wherein data is written to the lands from exposure by a light source.

9. The method of claim 4, further comprising rotating the glass master disk and exposing the selected portions with a laser prior to the etching.

10. The method of claim 4, wherein the deposited photoresist layer is between approximately 20 nm and 120 nm.

11. The method of claim 4, wherein the deposited photoresist layer is between approximately 80 and 90 nm.

13. The method of claim 1, wherein the dielectric layer comprises silicon oxynitride.

15. The method of claim 1, wherein the second stamper is a mother stamper.

16. The method of claim 1, wherein the father stamper is a first generation stamper, and the second stamper is an even-numbered generation stamper.

17. The method of claim 1, wherein the second stamper has features that are opposite in polarity to features of the father stamper.

18. The method of claim 1, wherein the plastic material is a polycarbonate material.

Evidence Appendix

None

Related Proceedings Appendix

There are no decisions rendered by a court or by the Board because there are no related proceedings.